

WHAT IS CLAIMED IS:

1. A contour compensation circuit that generates a contour-compensated signal, by which a signal level of a contour of an object is emphasized, from an image signal
5 obtained by an image pickup of the object, wherein
the generation of the contour-compensated signal is performed regarding one channel of channels that consists the image signal as a standard channel, and wherein
the generation of the contour-compensated signal is
10 performed in order to prevent an occurrence of a colored edge on the contour of the object, that are caused when the contour of the object is emphasized, and
the contour compensation circuit comprising:
a reverse gamma controller, which performs a reverse gamma
15 control on the standard channel, and obtains a liner standard channel;
a contour compensation signal generator, which generates a contour compensation signal from the liner standard channel;
a control signal generator, which computes a comparative
20 value from the liner standard channel and the contour compensation signal, and generates an evaluation value from a comparison between the comparative value and a threshold value, and
the control signal generator generates a plurality of
25 delayed evaluation values by the delay of the evaluation value, and select a minimum value from among the evaluation value and

the delayed evaluation values, and output a selected minimum value as a control signal;

a calculator, which computes the contour-compensated signal based on the contour compensation signal, and the
5 control signal, and the liner standard channel;

a contour compensation signal retarder, which receives the contour compensation signal from the contour compensation signal generator, and supplies the contour compensation signal to the calculator with delay; and

10 a reverse gamma signal retarder, which receives the liner standard channel from the reverse gamma controller, and supplies the liner standard channel to the calculator with delay.

15 2. A contour compensation circuit according to claim 1, wherein the control signal generator computes the evaluation value based on formula (1), when the comparative value exceeds a maximum level of a display device,

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$$\text{evaluation value} = (\text{maximum level} - \text{liner standard channel}) / \text{contour compensation signal} \quad \dots(1)$$

the control signal generator computes the evaluation value based on formula (2), when the comparative value less than a minimum level of the display device,

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$$\text{evaluation value} = (\text{minimum level} - \text{liner standard channel}) / \text{contour compensation signal} \quad \dots(2)$$

the control signal generator set the evaluation value to 1, when the comparative value less than the maximum level of the display device and the comparative value exceeds the
5 minimum level of the display device, wherein

the maximum level means that a maximum level of a signal that can be displayed on the display device, and wherein

the minimum level means that a minimum level of the signal that can be displayed on the display device.

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3. A contour compensation circuit according to claim 2, wherein the calculator including;

a multiplier, which obtains an adjusted contour compensation signal by a multiplication between the control
15 signal entered from the control signal generator and the contour compensation signal entered from the contour compensation signal retarder; and

an accumulator, which obtains the contour-compensated signal by the accumulation between the adjusted contour
20 compensation signal and the liner standard channel.

4. A contour compensation circuit according to claim 2, wherein the image signal includes R (Red) channel, B (Blue) channel, and G (Green) channel, and wherein

25 the reverse gamma controller regards the G (Green) channel as the standard channel, and performs a reverse gamma control

on the G (Green) channel.

5. A contour compensation circuit according to claim 2, wherein
the image signal includes R (Red) channel, B (Blue)
5 channel, G1 (Green 1) channel, and G2 (Green 2) channel, and
wherein

the reverse gamma controller generates a first liner
standard channel and a second line standard channel from the
G1 (Green 1) channel and the G2 (Green 2) channel, respectively,
10 by performing the reverse gamma control,

the contour compensation signal generator generates a
first contour compensation signal and a second contour
compensation signal from the first liner standard channel and
the second liner standard channel, respectively,

15 the control signal generator generates a first control
signal based on the first liner standard channel and the first
contour compensation signal, and generates a second control
signal based on the second liner standard channel and the second
contour compensation signal,

20 the calculator computes the first contour-compensated
signal based on the first contour compensation signal, the
first control signal, and the first liner standard channel, and
computes the second contour-compensated signal based on the
second contour compensation signal, the second control signal,
25 and the second liner standard channel,

the contour compensation signal retarder receives the

first contour compensation signal and the second contour compensation signal from the contour compensation signal generator, and supplies them to the calculator with delay, and the reverse gamma signal retarder receives the first liner standard channel and the second liner standard channel from the reverse gamma controller, and supplies them to the calculator with delay.

6. A method for performing a contour compensation that generates a contour-compensated signal, by which a signal level of a contour of an object is emphasized, from an image signal obtained by an image pickup of the object, wherein

the generation of the contour-compensated signal is performed regarding one channel of channels that consists the image signal as a standard channel, and wherein

the generation of contour-compensated signal is performed in order to prevent the occurrence of a colored edge on the contour of the object, that are caused when the contour of the object is emphasized, and the method comprising the steps of:

a reverse gamma control step, in which a liner standard channel is obtained by performing a reverse gamma control on the standard channel;

a contour compensation signal generation step, in which a contour compensation signal is generated from the liner standard channel;

a control signal generation step, in which a comparative

value is computed from the liner standard channel and the contour compensation signal, wherein

an evaluation value is generated from a comparison between the comparative value and a threshold value, and a plurality
5 of delayed evaluation values is generated by the delay of the evaluation value, and a control signal is generated by selecting the minimum value from among the evaluation value and delayed evaluation values, wherein

the evaluation value is computed based on formula (1),
10 when the comparative value exceeds a maximum level of a display device,

$$\text{evaluation value} = (\text{maximum level} - \text{liner standard channel}) / \text{contour compensation signal} \quad \dots(1)$$

15 the evaluation value is computed based on formula (2), when the comparative value less than a minimum level of the display device,

$$\text{evaluation value} = (\text{minimum level} - \text{liner standard channel}) / \text{contour compensation signal} \quad \dots(2)$$

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the evaluation value is set to 1, when the comparative value less than the maximum level of the display device and the comparative value exceeds the minimum level of the display device, wherein

25 the maximum level means that a maximum level of a signal that can be displayed on the display device, and wherein

the minimum level means that a minimum level of the signal can be displayed on the display device;

a calculation step, in which a contour-compensated signal is computed based on the contour compensation signal, and the
5 control signal, and the liner standard channel;

a contour compensation signal delay step, in which the contour compensation signal entered from the contour compensation signal generator is supplied to the calculator with delay; and

10 a reverse gamma signal delay step, in which the liner standard channel entered from the reverse gamma controller is supplied to the calculator.

7. A program that operates an apparatus so that the apparatus
15 generates a contour-compensated signal, by which a signal level of a contour of an object is emphasized, from an image signal obtained by an image pickup of the object, wherein

the generation of the contour-compensated signal is performed regarding one of channels that consists the image
20 signal as a standard channel, and wherein

the generation of contour-compensated signal is performed in order to prevent the occurrence of a colored edge on the contour of the object, that are caused when the contour of the object is emphasized, and the program comprising the functions
25 of:

a reverse gamma control function, by which a liner

standard channel is obtained from the standard channel by a reverse gamma control;

a contour compensation signal generation function, by which a contour compensation signal is generated from the liner
5 standard channel;

a control signal generation function, by which a comparative value is computed from the liner standard channel and the contour compensation signal, and an evaluation value is generated from a comparison between the comparative value
10 and a threshold value, a plurality of delayed evaluation values is generated by the delay of the evaluation value, and a control signal is generated by selecting the minimum value from among the evaluation value and delayed evaluation values, wherein
the evaluation value is computed based on formula (1),
15 when the comparative value exceeds a maximum level of a display device,

$$\text{evaluation value} = (\text{maximum level} - \text{liner standard channel}) / \text{contour compensation signal} \cdots (1)$$

20 the evaluation value is computed based on formula (2),
when the comparative value less than a minimum level of a display device,

$$\text{evaluation value} = (\text{minimum level} - \text{liner standard channel}) / \text{contour compensation signal} \cdots (2)$$

25

the evaluation value is set to 1, when the comparative

value less than a maximum level of a display device and the comparative value exceeds a minimum level of a display device, wherein

the maximum level means that the maximum level of the
5 signal that can be displayed on a display device, and wherein

the minimum level means that the minimum level of the signal can be displayed on the display device;

a calculation function, in which a contour-compensated signal is computed based on the contour compensation signal,
10 and the control signal, and the liner standard channel;

a contour compensation signal delay function, by which the contour compensation signal entered from the contour compensation signal generator is supplied to the calculator with delay; and

15 a reverse gamma signal delay function, by which the liner standard channel entered from the reverse gamma controller, is supplied to the calculator.

8. An image signal display device that generates a
20 contour-compensated signal, by which a signal level of a contour of the object is emphasized, from an image signal obtained by an image pickup of an object, wherein

the generation of contour-compensated signal is performed in order to prevent the occurrence of a colored edge on a contour
25 of the object, that are caused when the contour of the object is emphasized,

and wherein the object is displayed based on the
contour-compensated signal, the image signal display device
comprising:

a contour compensation circuit of claim 2;

5 a gamma controller, which performs the gamma control on
the contour-compensated signal supplied from the contour
compensation circuit, and obtains a converted
contour-compensated signal; and

a display device, which displays the object based on the
10 converted contour-compensated signal.